AMENDMENTS TO THE SPECIFICATION:

Please amend the paragraphs beginning at page 1, lines 14-25, as follows:

Refer to FIG. 1 which illustrates a future scenario which illustrates a vehicular network 1, for example Ethernet onboard a bus, ~~A~~ a non shown passenger has a personal local network (PAN) 2 to which a mobile phone and digital camera are connected. Another non shown passenger has also a PAN 3 to which an audio equipment and a video camera are connected. The PANs are wireless connected to an on-board wireless gateway WG that provides connectivity to an access router AR of a 4G wireless network or an access router of a wireless local area network (WLAN) 5, which in ~~its~~ turn provides connectivity to an access router of a land based IP backbone network 6. A 3G network 7 is also connected to the backbone network. A wireless lap top is ~~wireless~~ connected to the 3G network. Vehicle movements entail hand-over for the vehicle WG, but may remain entirely hidden to passengers.

The term always best connected (ABC) in multi-access networks refers to the concept of defining a set of access selection criteria and mechanisms that allow users to get connected to various services in a nearly optimal manner irrespective of the terminal type [1]. For instance, in the vehicular network the on-board WG provides cellular connectivity through 2.5/3G cellular technologies to the 4G wireless network 4 on the country-side ~~while it provides cellular connectivity~~ while it provides connectivity to the wireless local area

network 5 ~~while~~ at a central bus station. It is important to note that in such a situation, passengers may want to select access in order to being 'best' connected, even though they may use, for instance, an Ethernet interface from their respective user equipments to get connected to the WG.

Please amend the heading beginning at page 2, line 9, as follows:

~~DESCRIPTION OF RELATED ART~~

Please amend the paragraph beginning at page 3, lines 8-25, as follows:

~~The~~ An aspect of the present invention ~~also~~ offers a solution on the following problem: Passengers traveling in a vehicle need to be able to select the radio access network that provides connectivity from the vehicle's wireless gateway or, if the passenger's user terminal is equipped with a wireless interface, directly from the user terminal to the access router of a radio access network. Passengers are assumed to have user terminals that do not have information about the available accesses from the vehicle's wireless gateway.

~~The main~~ An object of the present invention is to provide a system and method for access selection which is independent ~~on~~ of the technology used in the access networks. An access technology independent access selector is completely unaware of the technology and QoS parameters used in layer 2 and beneath, which is ~~a main advantage~~ one of several advantages of the invention. ~~Other advantages achieved with the invention are~~ Another advantage is that no

modifications of the access selector or of the access algorithm need to be done if new access technology is introduced in access networks. An application which uses a technology independent access selector requires no access specific information included in its software. ~~These advantages are achieved with the invention defined in claim 1 and claim 13.~~

~~The advantage achieved with claim 2~~ Yet another advantage is that an application need not be aware of the access technologies, neither of the access selection adapters; it is sufficient an application has an interface with the spanning layer. In other words, access technologies and access selection adapters are transparent to the applications.

Please amend the paragraph beginning at page 4, line 6, as follows:

FIG. 6. is a functional view of an implementation of an access selector in accordance with an embodiment of the invention and a general access technology dependent access selection adapter,

Please amend the paragraph beginning at page 4, line 17, as follows:

The system of a first embodiment of the invention shown in FIG. 3 comprises a vehicular network 17 to which a plurality of user terminals (UTs) may connect. In FIG. 3 only one user terminal is shown at 18 for clarity reasons. The vehicular network can connect to a number of radio access networks 19, 20 each of which has an individual access technology. The access

networks are connected to a backbone network 21. There may be more access networks than the two shown. In order to connect to an access network the vehicular network comprises wireless gateways 22, 23, one ~~fore~~ for each type of access network technology. Wireless gateway 22 is thus adapted for access to an access router AR of access network 19, which uses access technology 1, over an air interface ~~24~~. Wireless gateway 23 is adapted for access to another access router AR of access network 20, which uses access technology 2, over another air interface ~~25~~. In the following the wireless gateways will be referred to as access selection adapters since they comprise novel hardware and software entities that provide access technology independent information used by an access selector 26 for access selection.

Please amend the paragraphs beginning at page 5, lines 11-13, as follows:

In the embodiment shown in FIG. 3 the access selector 26 is a network element connected to each of the access networks and to the backbone network.

In the embodiment shown in FIG. 4 the access selector 26 is ~~no~~ not a network ~~entity~~ element but is housed in the user terminal 18. The user terminal 18 also comprises the access selection adapters ~~23, 23~~ 22, 23 and its translators and access managers. The access selector 26 is connected to each one of the access selection adapters 22, 23. The entities shown in FIG. 4 are

the same as those shown in FIG. 3 and have therefore been indicated with the same reference designations. Note that the user terminal 18 has direct wireless connection to the access networks and that it is not connected to a moving vehicular network. The user terminal is moving. An application may use one access network simultaneously as another application is using another access network and the terminal is called a multi-access mobile terminal.

Please amend the paragraphs beginning at page 5, line 25 through page 6, line 8, as follows:

The user terminal comprises a number of applications 27. When an application 27 is installed on the terminal the user is typically asked for configuration preferences, such as default preference for which access to use when the user is at home, what kind of subscription the user has, in which cases the user as an example may reply with ADSL as preferred access and gold (or silver) as subscription type. All preferences given by the user are stored in a configuration database 28. When later ~~an~~ the application executes, the run time part of the application need not concern itself with the configuration information, since this information will automatically be delivered from the data base 28 to the entities which require this information. ~~Has~~ When an application ~~programmer forgotten to request the~~ has not yet received user ~~to provide his~~ preferences, it is possible for the application to use the preferences stored by a similar application in the database. The user may for example ~~give~~

have given his preference to use a minimum bit rate of 150 kbit/s for one video application. Another video application, in which ~~the programmer has forgotten to ask for~~ the user's preferred bit rate has not yet been received, may then use this value of 150 kbit/s.

It should be noted that an application ~~does not care~~ is not normally concerned about the access technology used, be it UMTS (Universal Mobile Telecommunications System), UTRAN (UMTS Terrestrial Radio Access Network) or any other 3.sup.rd or future 4.sup.th generation mobile system. Delay, however, is of concern for an application, and this and similar parameters will be touched upon in connection with the description of so called wireless hints.

Please amend the paragraphs beginning at page 6, lines 15-26, as follows:

A quality of service (QoS) controller 29 in the user terminal has ~~as its most~~ an important task to generate the requirements an application has on transport quality all the way from source to destination. A video application may for example require a minimum bandwidth and a maximum delay for transmission of a movie from a remote contents database in the backbone network to the user terminal. These QoS related requirements are access technology independent information called wireless hints and comprise a set of QoS related parameters (all of which are independent of the used access technology). The wireless hints of an individual application will in the following

be called the QoS profile of the application. The QoS profile generated by QoS controller 29 is communicated to the access selector 26 and is used therein as a first set of inputs upon which it bases its selection of access network.

A similar QoS controller 30 is resident in each of the access selection adapters. It is recalled that an individual access selection adapter is associated with a specific access network and the main task of the QoS controller 30 is to receive as input access technology dependent QoS related information (parameters) and map them to access technology independent status information. The status information generated by a QoS controller 30 is communicated to the access selector 26 and is used therein as a second set of inputs upon which it bases its selection of access network.

Please amend the paragraph beginning at page 7, lines 1, as follows:

A translator 31 is program software is access technology dependent. It understands messages and access specific parameters therein as received from an associated access manager 32. It translates messages and parameters received from its associated access network into QoS parameters which it transmits to its associated QoS controller 30 wherein they are mapped to the access technology independent status information for transmission to the access selector 26.

Please amend the paragraph beginning at page 8, lines 5, as follows:

The access selector 26 selects access network based on an application's QoS profile and the network's status information. The access selector 26 contains an access selection algorithm 33 which based on the first and second sets of inputs decides access network to be used for an individual application. The access selector 26 is independent of the technology used in the access networks. It is embodied in the form of program software and a de-multiplexer. An access network may broadcast its status information. An access selection adapter 22, 23 may also probe its associated network to obtain status information.

Please amend the paragraphs beginning at page 8, lines 14-21, as follows:

The access selection adapters ~~comprises~~ 22, 23 comprise a protocol spanning the access networks and the backbone network and the access selector 26, thus allowing interoperation between an application and an end terminal connected to the backbone network and making the access adapters transparent to the applications. Preferably an "all IP" technology is used. The protocols used for transmission of QoS profiles, status information, L2 triggers, and decision of access network, are the IPv4 and IPv6 protocol suits.

It should be noted that a user terminal 18 may have direct wireless access to an access router of an access network, overriding the vehicular network.

Please amend the paragraphs beginning at page 8, line 29 through page 9, line 17, as follows:

During Step 1 the access selector 26 collects input to its access selection algorithm 33 in response to the start of an application in the user terminal. The user terminal uses IP level QoS signaling to communicate the QoS profile and other preferences of the started application to the access selector 26. It is assumed here that the user terminal knows the IP address of the access selector 26.

In addition, the access networks that are available to the vehicular network 1 provide status information and make such information available to the access selector 26 using IP level QoS signaling.

In the embodiment shown in FIG. 3 the access selector 26 is directly connected to the access networks and therefore such status information can be directly communicated to the access selector 26 for example by using an access network specific interface towards the access selector 26.

In the embodiment shown in FIG. 4 where the access selector 26 is housed in the user terminal 18 the access selector 26 uses an IP level interface only and is for example connected to the backbone network as a selector server

entity. Also access networks ~~have to~~ use IP level signaling to transport status information to the access selector 26. In this latter case it is assumed the access network is capable of performing (1) translating access specific information to IP level information elements and (2) using IP level signaling towards the access selector 26.

The QoS profile as well as the status information can be updated periodically or on an 'event basis'. For instance, when the access technology provides L2 triggers, a L2 trigger signal can entail an IP level signal to the access selector 26, said L2 trigger containing information about the changes in the access network status, for example that the network connection has been degraded or improved.

Please amend the paragraph beginning at page 9, line 23, as follows:

During Step 2 the access selector 26 executes the access selection algorithm 33 that attempts to find the `best` access in terms of the QoS parameters given in the QoS profile associated with the application and possibly also given by other metrics. The output of this process is the identification of the access network that should be used by the application.

Please amend the paragraph beginning at page 9, line 29, as follows:

During Step 3 the access selector 26 communicates the access decision to the user terminal. For this purpose, the access selector 26 uses IP level QoS

signaling. Once the user terminal obtains this information, it instructs the associated access selection adapter 22, 23 to set up and configure the access technology specific radio bearer. At this stage, the application 27 is ready to use the selected access for user data transport.

Please amend the paragraph beginning at page 10, line 9, as follows:

In the FIG. 3 embodiment of the system the QoS profile and access decision is for example communicated to the access selector 26 over an 'old' access, that is an access previously used by the application, or is broadcasted in the selected access network.

Please amend the paragraph beginning at page 10, line 17, as follows:

Below the human level is an application level at which the application 27 executes. The application is configured from the database 28. The application signals to other entities, for example to a web server ~~24~~ 25 connected to the backbone network as shown in FIG. 3, and uses the SIP protocol for this (Session Initiating Protocol). Information elements appearing in the SIP protocol may be used as wireless hints.

Please amend the paragraphs beginning at page 10, line 27 through page 11, line 14, as follows:

The preferences selected by the user, the preferences stored in the data base 37 and those in data base 28 as well as selected SIP information elements are all communicated to the QoS controller 29 which assembles them and generate the wireless hints which are signaled to the access selector 26 using an IP QoS protocol, such as NSIS. This wireless hint signaling is illustrated by arrow 38.

A wireless hint shall hint the access selector 26 of the QoS to be used for transmission of user data over the air. The QoS parameters used as wireless hints need to be straightforward for the applications (and the application programmers) to set, a basic requirement is that these parameters ~~must~~ should be as simple as possible in terms of interpretation and how their values should be determined. This requirement suggests that these types of "wireless hints" should be qualitative rather than quantitative. For instance, we propose an "expected delay bound" parameter that provides a hint whether the application is delay sensitive or not, rather than requiring an exact value to be set. Since the parameter is qualitative, it can even be set by other entities (e.g. by a SIP signaling entity as described above) rather than requiring the application programmer or the human user to set/configure them. On the other hand, the parameters should help resource scarce (typically wireless and cellular) link resource managers to configure the wireless resources and QoS.

Suitable wireless hints are based on the Controlled Load (CL) integrated service parameters, as defined by RFC 2211. The CL service is intended to support a broad class of applications including adaptive real-time applications and it thus provides a reasonable base for defining the information elements. However, the wireless network characteristics and requirements ~~must~~ differ from typical wire-line interfaces and additional information is needed. Thus, it is proposed to extend the CL service with optional parameter information that will be useful for wireless networks to enable appropriate settings for the radio bearer characteristics. It is noted that although this optional information is proposed for the CL service, it may also be applied to other services e.g. Guaranteed Quality of Service.

Please amend the paragraphs beginning at page 11, line 33 through page 12, line 14, as follows:

FIG. 6 illustrates an implementation of a user terminal 18 and a generalized access selector adapter 22. The figure does not show the complete terminal structure but is focused on the interface between the user terminal and the access selection adapter 22.

IP packets are exchanged between the access selector 26 and the access adapter 22 and these packets contain access information, reservation/release router configuration and access system resources. This information is either

reported by the access network, which for example can broadcast it, or ~~is this~~ information requested by the access selector 26.

Wireless hints are reported to the access selector 26 from the QoS controller 29 as shown by arrow 38.

The user terminal 18 comprises an access manager 39, an associated layer 2-to-layer 3 translator 40 and the access selector 26. The access selector 26 comprises a set of link independent QoS related software processes for access procedures collectively shown at 41.

The access adapter 22 comprises a similar set of link independent QoS related software processes collectively shown at 42, an access manager 43, an associated layer 2-to-layer 3 translator 44, an access manager 45, an associated layer 2-to-layer 3 translator 46 and a translator 47 that translates layer 2 triggers, which are access dependent, into access independent information.

Please amend the paragraphs beginning at page 12, lines 21-29, as follows:

The abbreviation An defines a wireless access network onboard a vehicle, that is a first "hop" extending between the user terminal 18 and the access selection adapter 22. The "n" in An indicates that it can there may be several such wireless access networks, such as Bluetooth, WLAN, onboard the vehicle. If there are no such onboard wireless networks, and the terminal connects to

the access selection adapter 22 via a local wire based network, then no access managers 39 and 40 and corresponding translators are needed. Therefore these entities are shown with dashed lines.

The abbreviation Bn is a general definition of access between the access adapter 22 and a land or space based access network, for example access network 21 in FIG. ~~1~~ 3. The "n" in Bn indicates that ~~it can~~ there may be several such access networks. There is one access adaptor 22 for each access network, and accordingly only one B-access manager per access network, although the Bn access manager 45 in FIG. 6 intimates there may be several access managers in one and the same access adapter 22 because of the "n". Each one of the Bn access managers 45 handle a respective access that use different access technologies, each such technology requiring a respective bearer access manager. The Bn access managers need to be installed and configured in accordance with the existent access networks.

Please amend the paragraph beginning at page 13, line 25, as follows:

Table 1 below lists all messages with which the access selector 26 processes interact with the access selector adapters 22.

Please amend the paragraph beginning at page 14, line 6, as follows:

The access independent RH process is ~~essential~~ important in order to reserve and or release access system resources independently of access

technologies. Like other processes, the RH process is needed both in the access selector 26 and in the access adapter 22. The RH process in the access selector 26 requests for the attachment/resource release to/from the access system and returns an acknowledgment that this has occurred.

Please amend the paragraph beginning at page 14, line 14, as follows:

FIG. 7 discloses an embodiment of the access selector 26 which comprises access selector control logic 48, a preferred access selection result 49 and information 50 on the current access. There are three set of inputs to the control logic 48, two set of run time inputs and one set of configuration inputs. One set of run time inputs comprise the QoS profile from the user terminal and these are shown to the left at IU1-IU11. The QoS profile refers to desired characteristics of the access. The other set of run time inputs are the access status information provided from the access adaptors 22 and are shown to the right at I11-I13, I21-I32 and I31-I33. The status information refers to characteristics offered by the respective access networks. At the top of the rectangle of the access selector control logic 48 configuration inputs w1-w3 and N1-N3 from the databases 28 and 37 are shown. The access selector logic 48 comprises the access selector algorithm 33.

Please amend the paragraphs beginning at page 15, lines 20-28, as follows:

By matching the information given by access profile against the status information the control logic 48 returns information on the access network that has the best matching or returns an indication that none of the available access networks matches the desired QoS profile. This result is given as the preferred access selection. The preferred access selection is compared against the current access and if the two agree the access ~~in~~ is not changed. If the two disagree the access is changed to the preferred access or, in case no access is matching the QoS profile, the current access is maintained.

FIG. ~~7~~ 8 illustrates an example of a technology independent access selection algorithm that comprises three matching equations AC1, AC2 and AC3, one for each access network, and an access selection function fa(MAX(AC1, AC2, AC3)), where i=1, 2, 3 . . . , i being the number of available access networks. There is one matching function for each available access network. Output from the access logic is the result of the access selection function fa(MAX(AC1, AC2, AC3). In the access selection function fa(ACi) gives the index of the access system to be accessed; for example fa(AC3)=3 which is the access network 3. Thus access network 3 is selected.

Please amend the paragraph beginning at page 16, line 14, as follows:

If there is no output, then there is no match between requested service and available QoS parameter information. No access is made but is deferred to a later time when there is a match. To achieve this, the QoS profile is stored in the user terminal. The access selector 26 continues to receive status information from available networks or ~~to request~~ requests status information from these. At regular intervals, or from time to time, the access selector 26 retrieves the stored QoS profile and compares it with current status information from the available access networks. When there is a match an access network is returned from the algorithm and the terminal 18 is instructed to access it. The terminal will thus behave like it had a scheduling mechanism that schedules an access when the circumstances allow. For example if the user is onboard a vehicle that moves over areas where available access networks only allow a low bit rate, for example 64 kbit/s, and the user sends a request for download of streaming video, which according to its application's QoS profile requires a bandwidth of at least 500 kbit/s, then the access control logic 48 will store the QoS profile and continue to monitor available access networks. When the vehicle approaches a large city, a suitable access network with the required characteristics is detected and the access selector 26 will then automatically access this network and initiate a video streaming session.

Please amend the paragraph beginning at page 17, line 21, as follows:

FIG. 11 illustrates a layered QoS bearer service structure in the UMTS network shown in FIG. 10. A bearer service describes how a network provides QoS. It is defined by a signaling protocol, transport in the user plane, and QoS management functions. An application 27 in the user terminal 18 signals end-to-end to a web server 25 connected to the backbone network 21. The situation is illustrated in FIG. 3 and is specialized to an UMTS network. The access adapter or wireless gateway 22 is in this case a PCMCIA card (Personal Computer Modular Card International Association) which the user has inserted into his lap top (user terminal). In an end-to-end bearer service 55 the IP protocol suite is used at layer 3. Preferably IPv4 or IPv6 is used. Accordingly IP is used as a spanning layer i.e. a layer spanning all the entities 27, 18, 22, 51, 53, 54 and 25. It is thus possible for the application 27 to communicate with the access selector 26, the web server 25 or even an application resident in the web server. As indicated in the Figure Bluetooth or WLAN can be used as bearer service between the user terminal 18 and the access selection adapter 22. The QoS controller 30, translator 31 and access manager 32 in the access selection adapter 22 are shown as dashed ellipses. The layered structure makes it clear that the translator 31 translates messages and information from layer 2 to layer 3.